

WHAT IS CLAIMED IS:

1. A zoom lens, comprising: a first lens group having a positive refracting power and being fixed with respect to an image plane; a second lens group having a negative refracting power and varying power by moving along an optical axis; a third lens group having a positive refracting power and fixed with respect to the image plane; and a fourth lens group having a positive refracting power and moving along an optical axis so as to keep the image plane varied by a shift of the second lens group and an object at a predetermined position from a reference surface, the first, second, third and fourth lens groups being disposed from the object side in this order, wherein the entire third lens group is moved vertically with respect to the optical axis so as to correct a movement of an image during camera shake.
2. A zoom lens according to claim 1, wherein the third lens group is composed of one lens.
3. A zoom lens according to claim 1, wherein the third lens group is composed of two lenses: one positive lens and one negative lens.
4. A zoom lens according to claim 1, wherein the third lens group is composed of three lenses comprising at least one positive lens and at least one negative lens.
5. A zoom lens according to claim 4, wherein the third lens group comprises a positive lens, and a cemented lens of a positive lens and a negative lens.
6. A zoom lens according to claim 1, wherein the third lens group comprises at least one aspherical surface.
7. A zoom lens according to claim 1, wherein the fourth lens group comprises at least one aspherical surface.
8. A zoom lens according to claim 1, wherein a shifting amount Y of the third lens group at a focal length f of an entire system when correcting camera

shake, a shifting amount Y_t of the third lens group at a telephoto end, and a focal length f_t of the telephoto end satisfy the following conditional expressions

$Y_t > Y$; and

$(Y/Y_t) / (f/f_t) < 1.5$.

9. A zoom lens according to claim 1, wherein a focal length f_3 of the third lens group and a focal length f_w of an entire system at a wide-angle end satisfy the following conditional expression

$2.0 < f_3/f_w < 4.0$.

10. A zoom lens according to claim 1, wherein a surface on the object side of a lens disposed closest to the object side in the third lens group is aspherical, and a local radius of curvature R_{10} in the vicinity of an optical axis and a local radius of curvature R_{11} in an outer peripheral portion satisfy the following conditional expression

$1.05 < R_{11}/R_{10} < 2.5$.

11. A zoom lens according to claim 1, wherein a surface on the object side of a lens disposed closest to the object side in the fourth lens group is aspherical, and a local radius of curvature R_{20} in the vicinity of an optical axis and a local radius of curvature R_{21} in an outer peripheral portion satisfy the following conditional expression

$1.05 < R_{21}/R_{20} < 2.0$.

12. A video camera provided with a zoom lens of any one of claims 1 to 11.

13. A zoom lens, comprising: a first lens group having a positive refracting power and fixed with respect to an image plane; a second lens group having a negative refracting power and varying power by moving along an optical axis; a third lens group fixed with respect to the image plane; a fourth lens group fixed with respect to the image plane; and a fifth lens group having a positive refracting power and moving along an optical axis so as to keep the image plane varied by a shift of the second lens group and an object at a predetermined position from a reference surface, the first, second, third, fourth and fifth lens groups being disposed from the object side in this order,

wherein the third lens group and the fourth lens group compose a combination of a lens group having a positive refracting power and a lens group having a negative refracting power, and either the third or fourth lens group is moved vertically with respect to the optical axis so as to correct movement of an image during camera shake.

14. A zoom lens according to claim 13, wherein either the third or fourth lens group that is moved vertically with respect to the optical axis so as to correct movement of the image during camera shake is composed of two lenses: one positive lens and one negative lens.

15. A zoom lens according to claim 13, wherein the third lens group has a positive refracting power and the fourth lens group has a negative refracting power, and the third lens group is moved vertically with respect to the optical axis so as to correct movement of the image during camera shake.

16. A zoom lens according to claim 13, wherein the fourth lens group is composed of two lenses separated from each other: one positive lens and one negative lens.

17. A zoom lens according to claim 13, wherein the fourth lens group is composed of two cemented lenses: one positive lens and one negative lens.

18. A zoom lens according to claim 13, wherein the third lens group has a negative refracting power and the fourth lens group has a positive refracting power, and the fourth lens group is moved vertically with respect to the optical axis so as to correct movement of the image during camera shake.

19. A zoom lens according to claim 13, wherein the third lens group and the fourth lens group are composed two lenses respectively, and Abbe's number v_{31} of one lens of the third group, Abbe's number v_{32} of the remaining lens of the third group, Abbe's number v_{41} of one lens of the fourth group and Abbe's number v_{42} of the remaining lens of the fourth group satisfy the following conditional expressions

$$|v_{31}-v_{32}|>25$$

$$|v_{41}-v_{42}|>25.$$

20. A zoom lens according to claim 13, wherein either the third or fourth lens group that is moved vertically with respect to the optical axis in order to correct movement of an image during camera shake is composed of two lenses: one lens having a positive refracting power and one lens having a negative refracting power being disposed separately from the object side in this order, and the lenses have sag amounts equal in the object side and in the image side.

21. A zoom lens according to claim 13, wherein either the third or fourth lens group that is moved vertically with respect to the optical axis in order to correct movement of an image during camera shake is composed of three lenses comprising at least one positive lens and at least one negative lens.

22. A zoom lens according to claim 13, wherein either the third or fourth lens group that is moved vertically with respect to the optical axis in order to correct movement of an image during camera shake is composed of one lens.

23. A zoom lens according to claim 13, wherein either the third or fourth lens group that is moved vertically with respect to the optical axis in order to correct movement of an image during camera shake comprises at least one aspherical surface.

24. A zoom lens according to claim 13, wherein either the third or fourth lens group that is moved vertically with respect to the optical axis in order to correct movement of the image during camera shake comprises a convex lens having an aspherical surface when viewed from the object side, and a local radius of curvature r_{S1} for a diameter occupying 10% of a lens effective diameter and a local radius of curvature r_{S9} for a diameter occupying 90% of a lens effective diameter satisfy the following conditional expression

$$0.01 < r_{S1}/r_{S9} < 2.00.$$

25. A zoom lens according to claim 13, wherein a focal length f_3 of the third lens group and a focal length f_{34} of a composite focal length of the third and fourth lens group satisfy the following conditional expression

$$0.40 < |f_3/f_{34}| < 0.85.$$

26. A zoom lens according to claim 13, wherein a focal length f_w of an

entire system at the wide-angle end and a distance BF between the final surface of the lens and the image plane in the air satisfy the following conditional expression

$$0 < BF < f_w < 5.0.$$

27. A zoom lens according to claim 13, wherein a focal length f_w of an entire system at the wide-angle end, focal length f_i ($i=1-5$) of the i -th lens group, and a composite focal length f_{34} of the third and fourth lens groups satisfy the following expressions

$$5.0 < f_1 / f_w < 8.0$$

$$0.5 < |f_2| / f_w < 1.6$$

$$4.0 < f_{34} / f_w < 9.5$$

$$2.0 < f_5 / f_w < 5.0.$$

28. A zoom lens according to claim 13, wherein a shifting amount Y of the third lens group at a focal length f of an entire system during correcting camera shake, a shifting amount Y_t of the third lens group at a telephoto end and a focal length f_t of the telephoto end satisfy the following conditional expressions

$$Y_t > Y;$$

$$(Y / Y_t) / (f / f_t) < 1.5.$$

29. A video camera provided with a zoom lens of any one of claims 13 to 28.